Claims

What is claimed is:

1. An optical switch comprising:

at least one first set of ports for receiving in parallel an optical byte of data;

multiple second sets of ports, each second set of ports being capable of outputting in parallel the optical byte of data; and

an array of optical switching elements disposed between the at least one first set of ports and the multiple second sets of ports, wherein the array of optical switching elements direct the optical byte of data in parallel from the at least one first set of ports to at least one second set of ports of the multiple second sets of ports.

2. The optical switch of claim 1, wherein the array of optical switching elements comprises an array of micro-electro mechanical system (MEMS) devices, each MEMS device having a position controllable reflective surface.

3. The optical switch of claim 2, wherein MEMS devices of the array of MEMS devices are grouped in subsets, each subset of MEMS devices being controllable to facilitate transfer of the optical byte of data in parallel from the at least one first set of ports to the at least one second set of ports of the multiple second sets of ports.

4. The optical switch of claim 1, wherein the array of optical switching elements direct the optical byte of data from the at least one first set of ports to the at least one second set of ports using at least one wavelength of the optical byte of data.

5. The optical switch of claim 4, wherein at least some optical switching elements of the array of optical switching elements comprise optical filters, each optical filter transferring optical data of a selected wavelength.

6. The optical switch of claim 5, wherein the optical byte of data comprises a plurality of bits of optical data, and the plurality of bits of optical data have a common wavelength, and wherein the optical filters assist in selecting the at least one second set of ports based on the common wavelength of the bits of optical data.

7. The optical switch of claim 5, wherein the optical byte of data comprises a plurality of bits of optical data and at least some bits of optical data of the optical byte of data comprise different wavelengths, and wherein the array of optical switching elements directs the optical byte of data from the at least one first set of ports in parallel to the at least one second set of ports notwithstanding that the at least some bits of optical data have different wavelengths.

8. The optical switch of claim 1, further comprising control logic for controlling switching of the array of optical switching elements to direct the optical byte of data in parallel from the at least one first set of ports to the at least one second set of ports.

9. The optical switch of claim 1, wherein the at least one first set of ports, the multiple second sets of ports, and the array of optical switching elements are bidirectional, allowing optical bytes of data to be transferred in parallel from any one of the at least one first set of ports and the multiple second set of ports to another of the at least one first set of ports and the multiple second sets of ports.

10. The optical switch of claim 1, wherein the array of optical switching elements directs in parallel the optical byte of data received at the at least one first set of ports to at least two second sets of ports of the multiple second sets of ports.

11. A computing system comprising:

at least one computing subsystem having at least one processing unit and at least one bus adapter through which the at least one processing unit communicates with at least one input/output (I/O) subsystem; and

at least one optical switch optically coupled between the at least one bus adapter and the at least one I/O subsystem, the at least one optical switch transferring in parallel an optical byte of data received at a first set of ports to at least one second set of ports, the at least one second set of ports being selected from multiple second sets of ports of the at least one optical switch.

12. The computing system of claim 11, further comprising control logic for controlling selection of the at least one second set of ports to receive the optical byte of data in parallel from the first set of ports.

13. The computing system of claim 11, wherein the at least one optical switch comprises multiple optical switches and the at least one I/O subsystem comprises multiple I/O subsystems, wherein the multiple optical switches are optically coupled between the at least one bus adapter and the multiple I/O subsystems, and the computing system further comprises at least one optical link disposed between the at least one bus adapter and a set of ports of each optical switch of the multiple optical switches.

14. The computing system of claim 13, wherein second sets of ports of at least one optical switch of the multiple optical switches are optically linked to different I/O subsystems.

15. The computing system of claim 11, wherein the at least one optical switch comprises an array of optical switching elements, the array of optical switching elements comprising an array of micro-electro mechanical system (MEMS) devices, each MEMS device having a position controllable reflective surface.

16. The computing system of claim 15, wherein the array of optical switching elements directs the optical byte of data from the first set of ports in parallel to the at least one second set of ports using at least one wavelength of the optical byte of data.

17. The computing system of claim 15, wherein at least some MEMS devices of the array of MEMS devices comprise optical filters, each optical filter transferring optical data of a selected wavelength.

18. The computing system of claim 15, wherein the first set of ports, the at least one second set of ports, and the array of optical switching elements are bidirectional, allowing optical bytes of data to be transferred in parallel from any one of the first set of ports and the at least one second set of ports to another of the first set of ports and the at least one second set of ports.

19. A device comprising:

a substrate having multiple layers disposed thereon, said multiple layers comprising:

a first optical waveguide layer having at least one first set of ports for receiving in parallel an optical byte of data;

a second optical waveguide layer having multiple second sets of ports capable of outputting in parallel the optical byte of data; and

an optical switching element layer for facilitating directing of the optical byte of data in parallel from the at least one first set of ports of the first optical waveguide layer to at least one second set of ports of the multiple second sets of ports of the second optical waveguide layer.

20. The device of claim 19, further comprising optical vias disposed within at least some layers of the multiple layers for facilitating passing of the optical byte of data between the first optical waveguide layer, the optical switching element layer, and the second optical waveguide layer.

21. The device of claim 19, wherein the optical switching element layer comprises an array of optical switching elements, said array of optical switching elements comprising an array of micro-electro mechanical system (MEMS) devices, each MEMS device having a position controllable reflective surface.

22. The device of claim 21, wherein at least some optical switching elements of the array of optical switching elements comprise optical filters, each optical filter transferring optical data of a selected wavelength, and wherein the array of optical switching elements direct the optical byte of data in parallel from the at least one first set of ports to the at least one second set of ports using at least one wavelength of the optical byte of data.

23. The device of claim 19, wherein the device is integrated within a multichip module containing at least one processing unit.

24. The device of claim 19, wherein the first optical layer comprises multiple first sets of ports, and wherein the first optical waveguide layer, the second optical waveguide layer, and the optical switching element layer are each bidirectional.

25. A switching method comprising:

receiving in parallel an optical byte of data at a first set of ports of an optical switch; and

employing an array of optical switching elements within the optical switch for transferring the optical byte of data in parallel from the first set of ports to a second set of ports of the optical switch.

26. The method of claim 25, wherein the array of optical switching elements comprises an array of micro-electro mechanical system (MEMS) devices, each MEMS device having a position controllable reflective surface, and wherein the employing comprises controlling positioning of the reflective surfaces of the MEMS devices in order to transfer in parallel the optical byte of data from the first set of ports to the second set of ports.

27. The method of claim 26, further comprising employing at least one wavelength of the optical byte of data in transferring the optical byte of data in parallel from the first set of ports to the second set of ports using optical filtering and the array of optical switching elements.

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